

CLAIMS

1. A method for processing a layer of material sensitive to radiation, the layer being formed on a substrate, the method comprising:

irradiating the material with said radiation; and

5 developing the material to remove a portion of the material and expose a portion of the substrate, creating a pattern defined by the exposed portion of the substrate;

wherein the irradiating operation comprises:

(a) irradiating said material with said radiation through a first mask, wherein the first mask has a clear region and a non-clear region; and

10 (b) irradiating said material with said radiation without a mask, or through a second mask which has a clear region at a position of at least a portion of the non-clear region of the first mask, wherein a radiation dose in the operation (b) is insufficient by itself to enable the developing operation to create a pattern with a portion of the substrate exposed and a portion of the substrate not exposed.

15 2. The method of Claim 1 wherein a radiation dose in the operation (a) is insufficient by itself to modify the material to enable the developing operation to create said pattern.

3. The method of Claim 1 wherein the material is a positive resist, and the radiation dose in the operation (b) is insufficient by itself to make the resist irradiated in
20 the operation (b) removed in the developing operation.

4. The method of Claim 1 wherein the material is a negative resist, and the radiation dose in the operation (b) is insufficient by itself to make the resist irradiated in the operation (b) withstand the resist removal in the developing operation.

5. The method of Claim 1 wherein the operation (b) comprises irradiating
25 said material through the second mask which has a non-clear region in addition to the clear region.

6. The method of Claim 5 wherein the non-clear region of the first mask has a cavity, and the clear region of the second mask overlaps the position of the non-clear region of the first mask at said cavity.

30 7. The method of Claim 6 wherein the non-clear region of the second mask does not have a cavity at a position of the cavity of the first mask.

8. The method of Claim 5 wherein the clear region of the first mask comprises two clear sub-regions separated by a non-clear gap; and

the clear region of the second mask covers the position of the non-clear gap.

9. The method of Claim 5 wherein the second mask is clear at each position
5 at which the first mask is clear.

10. The method of Claim 5 wherein the clear region of the second mask does not cover the entire position of the clear region of the first mask.

11. The method of Claim 5 wherein the clear region of the first mask comprises a contiguous elongated region surrounded by the non-clear region of the first
10 mask, the contiguous elongated region having a convex end abutting the non-clear region of the first mask; and

the clear region of the second mask overlaps the position of the non-clear region of the first mask at said end, and extends at least to the position of a boundary between said end and the non-clear region of the first mask.

12. The method of Claim 11 wherein the clear region of the second mask
15 covers the position of the boundary of said end and extends beyond the position of said boundary transversally to the direction of the elongated region.

13. The method of Claim 5 wherein the clear region of the first mask comprises a plurality of contiguous elongated regions surrounded by the non-clear region
20 of the first mask, each elongated region having a convex end abutting the non-clear region of the first mask; and

the clear region of the second mask comprises a contiguous region that overlaps the position of the non-clear region of the first mask and extends at least to the position of each said end.

14. The method of Claim 5 wherein the clear region of the second mask
25 covers a position of the clear region of the first mask and extends beyond the position of the clear region of the first mask.